Chemistry 129.01 Quiz #6 – 25 points

Name: _____

Solve the following problems:

1. (16 pts.) Consider the O_2 ion.

   (a) Draw its molecular orbital diagram and write its electron configuration.

   (b) What are the shapes of the molecular orbitals σ_{2p} and σ_{2p}* ?

   (c) Determine its bond order. Is O_2 stable? Is O_2 paramagnetic or diamagnetic?

   (d) If two electrons are added to form O_2^{2-}, how many unpaired electrons would O_2^{2-} have? Calculate the bond order of O_2^{2-}. Which would you expect to have the stronger bond, O_2 or O_2^{2-}? Longer bond? Explain

2. (5 pts) The IR spectrum of ammonia vapor shows a bending vibrational mode band at $\tilde{\upsilon} = 1500\,\mathrm{cm^{-1}}$. Calculate wavelength (in nm) and the energy of the photon absorbed.

3. (4 pts) Name two examples of greenhouse gases and their source.